DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR § 1.114, including the fee set forth in 37 CFR § 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR § 1.114, and the fee set forth in 37 CFR § 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR § 1.114. Applicant's submission filed on 27 March 2008 has been entered.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. The rejections of pending claims under 35 U.S.C. § 102(b) as being anticipated by Bedbrook *et al* (U.S. Patent 5,414,870) or Sathasivan *et al* (U.S. Patent 5,767,366) are withdrawn in view of Applicants' amendments to the claims, specifically claim 1.

Claim Rejections - 35 USC § 103

4. Claims 1-5, 7, 9 and 11 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over Sathasivan *et al* (U.S. Patent 5,767,366) in view of Edwards *et al* (WO 99/06575) and Bedbrook *et al* (U.S. Patent 5,414,870). This rejection is maintained for the reasons of record set forth in the Office action mailed 28 September 2007 and has been modified in view of Applicants' amendments. Applicants' arguments filed 27 March 2008 have been fully considered but are not found to be persuasive.

Sathasivan *et al* teach a vector comprising a DNA sequence encoding an *Arabidopsis thaliana* AHAS protein having an asparagine to serine mutation at amino

acid 653, said AHAS protein being tolerant to imidazolinone herbicides (see claim 1 and column 7, 2nd paragraph). Sathasivan *et al* teach a 5.8 kb DNA fragment that appears to have the sequence of Applicants' SEQ ID NO: 1, said fragment being of the same size and acknowledged by Applicants' as being used in the instant invention at page 11, 2nd paragraph of the instant specification. Sathasivan *et al* teach transforming tobacco cells with said vector, selecting transformed cells with different concentrations of imazapyr, and regenerating transformed, imazapyr resistant whole plants (columns 13-14). The 5.8 kb DNA fragment taught by Sathasivan *et al* comprises the homologous promoter and termination regions. Sathasivan *et al* teach transforming potatoes with said vector at column 9, line 4, hence inherently disclose potato plant cells, plants and harvest products comprising said DNA sequence. Sathasivan *et al* do not teach using imazamox (instant claim 7) in the selection process, but imazamox would have been an obvious analogue of the imazapyr used by Sathasivan *et al* at column 14, 1st paragraph. Sathasivan *et al* teach that the mutant gene [of the invention] can be used as a selection marker in plant transformation systems with its native promoter in dicots (column 15, lines12-15).

Sathasivan *et al* do not teach a heterologous DNA sequence encoding an antisense RNA or a DNA that contains information that causes changes in the carbohydrate concentration and carbohydrate composition of regenerated potato plants. Sathasivan *et al* do not teach the nucleotide sequence of instant SEQ ID NO: 1.

Edwards *et al* teach transforming a potato plant with a sense or antisense construct of an isoamylase coding region wherein expression of the antisense construct

to increase the production of amylopectin type starches, or overexpression of the sense construct to increase the production of amylose type starches (see page 10). Edwards *et al* teach that selectable genetic markers consisting of chimaeric genes that confer selectable phenotypes such as resistance to imidazolinones can be used (page 21, 2nd paragraph).

Bedbrook *et al* teach transforming plant cells with a vector comprising a nucleic acid fragment encoding an *Arabidopsis thaliana* AHAS promoter, coding region and terminator region (see figure 10) and selecting transformed cells resistant to an imidazolinone herbicide and regeneration of a transformed plant at columns 28-29. The disclosed nucleic acid fragment would hybridize to a complementary strand of the sequence of Applicants' SEQ ID NO: 1, and teaches an analogue or fragment of Applicants' SEQ ID NO: 1. Bedbrook *et al* teaches that the vector can also comprise a nucleic acid that encodes a gene of interest conferring some agronomically useful trait, which would inherently encode proteins and peptides at column 29, lines 1-5. Bedbrook *et al* teach that the use of potato is encompassed by the taught method of using said nucleic acid fragment at column 28, lines 20-31.

Expression of transgenes, including herbicide resistance transgenes, in *Solanaceae* plants such as tobacco and potato was routine in the instant art at the time of Applicants' invention. Sathasivan *et al* using tobacco demonstrate that one of ordinary skill in the instant art would have had a reasonable expectation of success in using imidazolinone resistance produced by a mutant AHAS enzyme encoding transgene to select for transformed potato plants. Edwards *et al* teach that those of

ordinary skill in the art would have been motivated to combine a selection marker with a sense or antisense construct of the potato isoamylase transgene to modify amylopectin or amylase type starches. Edwards *et al* teach using selectable genetic markers to resistance to imidazolinones at page 21, 2nd paragraph. It would have been *prima face* obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the teachings of Sathasivan *et al* to use the *Arabidopsis thaliana* AHAS promoter, coding region and terminator region as taught by Bedbrook *et al*.

Applicants argue that the method as provided by the present application uses a mutated AHAS gene conferring imidazoline type herbicide resistance as a selection marker, without the aid of an antibiotic selection, to achieve transformation efficiency higher than any efficiency rate known in the art at the time of filing (page 5, 4th paragraph of the Remarks). This argument is not found to be persuasive. Sathasivan *et al* teach that the mutant gene [of the invention] can be used as a selection marker in plant transformation systems with its native promoter in dicots (column 15, lines12-15).

Applicants argue that Sathasivan does not teach or suggest that a heterologous DNA sequence containing information that causes changes in the carbohydrate concentration or the carbohydrate composition of regenerated potato plants can be used with the mutated AHAS protein encoding DNA sequence for transformation, as acknowledged by the Examiner (page 6, 2nd paragraph of the Remarks). In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants argue that as disclosed in Sathasivan, the selection of transgenic plants was done by using the kanamycin resistance gene. See Sathasivan, Col. 13, lines 10-12. Applicants argue that although the AHAS resistance gene was present, the herbicide imazapyr was not used as selection agent. Col. 13, lines 12-13. Instead, Sathasivan teaches the use of an antibiotic, not an imidazolinone herbicide, for selection of transformants. Applicants argue that the disclosure regarding the difficulty of cloning a fragment of 5.8 kb in an 11.5 kb vector without additional kanamycin selection marker (see Col. 12, lines 58-60) further suggests that antibiotic selection provides a more efficient method in selecting transformants. Applicants argue that in view of this teaching, one skilled in the art would not have been motivated to substitute the antibiotic selection with other means such as the imidazolinone herbicide as selection agent. Applicants argue that the skilled artisan would not have had a reasonable expectation of success that the use of imidazolinone herbicide as selection agent alone, without the aid of antibiotic selection, would provide a high efficiency in selecting transformants as discovered by the inventors of the present application. Applicants argue that because there is no suggestion or motivation in Sathasivan of the method as now claimed, it is respectfully submitted that Sathasivan does not render the method as now claimed *prima facie* obvious (page 6, 3rd paragraph of the Remarks). These arguments are not found to be persuasive. Sathasivan *et al* teach that the mutant gene [of the invention] can be used as a selection marker in plant transformation

systems with its native promoter in dicots (column 15, lines12-15). While Sathasivan *et al* teach that is would be preferable to use an initial antibiotic selection step to avoid selecting for spontaneous mutants resistant to the herbicide (column 13, 2nd paragraph), the prior art does not teach away from use of the mutant AHAS as a selection marker in plant transformation systems, but actually suggests such a use.

Applicants argue that all of the plasmids used in Edwards contain antibiotic resistant genes as selection markers. Applicants argue that none of them contain an AHAS selection marker. Applicants argue that Edwards does not teach or suggest the use of imidazolinone herbicide as selection agent, much less that improved selection efficiency can be attained with herbicide selection. Applicants argue that the combination of Sathasivan and Edwards does not teach or suggest a highly efficient selection method as recited in the present claims using solely an imidazolinone type herbicide as a selection agent without the aid of any antibiotic selection agent. These arguments are not found to be persuasive. Edwards *et al* teach that selectable genetic markers consisting of chimaeric genes that confer selectable phenotypes such as resistance to imidazolinones can be used (page 21, 2nd paragraph).

Applicants argue that *a prima facie* case of obviousness is rebuttable by evidence that the claimed invention possesses unexpectedly advantageous or superior properties. Applicants argue that in the specification at pages 4-5, the highest transformation efficiency achieved by using nptII as selection marker in potato transformation known in the art is 73%, which was further confirmed by the present application in Example 10, at page 20. Applicants argue that despite the teaching away

of the art (for example, Bedbrook and Sathasivan as discussed above), the inventors of the present application discovered that the selection efficiency could be dramatically improved to as high as 100% by using a mutated AHAS gene as selection marker in potato transformation without the presence of an antibiotic selection gene. Applicants argue that Applicants have disclosed that the use of a mutated AHAS gene as selection marker in potato transformation in the absence of an antibiotic selection gene generates results which could not have been predicted (page 7, 2nd paragraph of the Remarks). The Examiner has reviewed the evidence Applicants use to rebut the instant rejection in Table 2 on page 20 of the instant application. These arguments are not found to be persuasive. Applicants' assertion of unexpected results are not commensurate with the scope of the claimed invention. See *In re Lindner*, 173 USPQ 356 (CCPA 1972) and *In re Grasselli*, 218 USPQ 769 (Fed. Cir. 1983) which teach that the evidence of nonobviousness should be commensurate with the scope of the claims. In the instant case, Applicants' asserted unexpected results appear to be related to the potato variety used, the construct used and the amount of the specific imidazolinone, imazamox, used in the claimed method. In addition, there does not appear to be a direct correlation in the asserted evidence to support unexpected results. The potato variety Prevalent has the second lowest transformation efficiency when using the lower concentration of Imazamox, but the highest transformation efficiency using the higher concentration of Imazamox. The examiner notes also that the shoots selected for the transformation efficiency test in Table 2, Applicants first selected transformed shoots based on expression of GUS activity (page 19, lines13-35, of the instant specification).

Conclusion

5. No claims are allowed.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David H. Kruse, Ph.D. whose telephone number is (571) 272-0799. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached at (571) 272-0975. The central FAX number for official correspondence is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group Receptionist whose telephone number is (571) 272-1600.

/David H Kruse/
Primary Examiner, Art Unit 1638
3 June 2008